

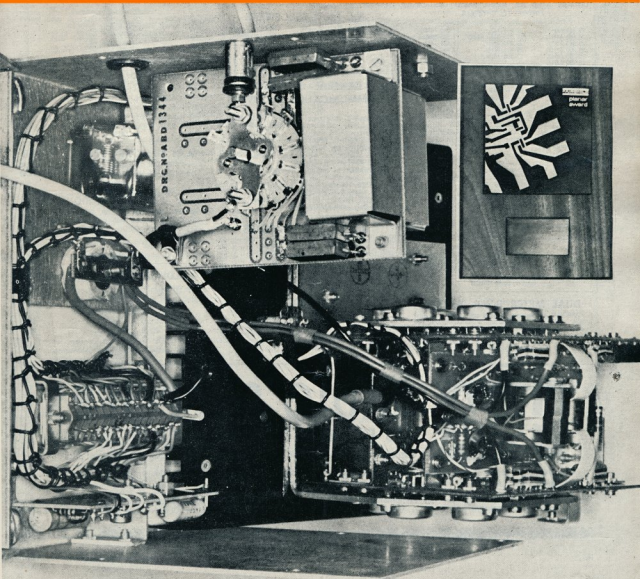
amateur radio

Vol. 38, No. 12

DECEMBER, 1970

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amateur radio

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COVER STORY

Our front cover this month shows what is claimed to be the first commercially available, fully solid state, 100 watt linear high frequency amplifier in the world. The unit, manufactured by Racal (Aust.) Pty. Ltd., won the Fairchild Planar Award for 1970. Full story on page 18.



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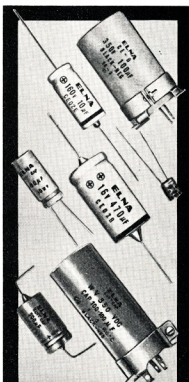
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AN IMPORTANT SPEECH

The Annual Dinner of the Wireless Institute of Australia, Victorian Division, was held on Wednesday, 28th October. Amongst the guests were Mr. E. J. Wilkinson, Assistant Director-General Radio, and Mr. H. Young, Controller, Radio Branch. Also present was Mr. Bob Booth, W3PS, the General Counsel of the American Radio Relay League.

The toast to the Institute was proposed by Mr. Wilkinson and his speech in proposing the toast is of general interest. Mr. Wilkinson commenced by referring to the fact that this was the sixtieth year of the Wireless Institute. He pointed out that 1970 was significant for other reasons. Firstly, Australis Oscar-5 had been launched in 1970 which he described as probably the most meritorious effort in the history of the technical side of the Wireless Institute. He congratulated those concerned on their achievement and wished them "Good luck with the next one."

Mr. Wilkinson also pointed out that 1970 is the year of the skirmishing and behind-the-scenes lobbying in preparation for the 1971 World Administrative Radio Conference on Space Communications. He said that the Wireless Institute of Australia is in the front rank fighting for Amateurs' rights, seeking new spectrum above 20 GHz. and protecting its "real estate" below that frequency. Significantly, Mr. Wilkinson said that he believed that the Institute is holding its own—"Its performance to date certainly measures up with the other efforts in this area that we have seen from the Australian Post Office side".

He said that the Australian Post Office was conferring with the various users of radio frequency and many of these would jump at some of the precious areas that are at present allocated to the Amateur Service. Mr. Wilkinson

said, quite bluntly, that one of the pressures on the Post Office was the claim by these other users that the Amateur Service was not using its allocations. Once again I quote from what Mr. Wilkinson said:

"We know you're doing your best to hold on to the areas that you already have and enjoy—would you please help by making use of them! You may have seen some of the statements about the number of signals on the air in the 144 MHz. band and the 432 MHz. band. If ever there was a time for the Australian Amateur to make plenty of use of these v.h.f., low u.h.f. and even the higher u.h.f. bands that adjoin some of the areas that are being used by the space people, then this is the year and this is the time."

Then Mr. Wilkinson referred to a matter that is of far reaching significance in Amateur circles. I propose again to quote his words, but before doing so, this matter requires some little explanation. The allocation 7-7.1 MHz. is allocated on a world-wide basis exclusively to the Amateur Service. In Region III. and Region I., the band 7.1-7.3 MHz. is allocated to the broadcasting service. In Region II. that area is allocated exclusively to the Amateur Service. Early this year the Institute made representations to our Administration to extend the Australian Amateur allocation (which is 7-7.1 MHz. exclusive and 7.1-7.15 MHz. shared) to 7.3 MHz., thus bringing our allocation in line with the allocations in the United States of America and other Region II. countries.

In the course of his speech, Mr. Wilkinson made the first public reference to this representation: "Dare I mention the 7 MHz. band which will probably be dear to a few people's hearts. It is perhaps strange that at

the time that the space frequencies are being talked about, there is a strong feeling in the Australian Post Office that we ought to do something about bringing Australia into line with Region II. in that precious 7.1-7.3 MHz. area. Let's hope we can do something. You know it's a Region III. problem, not just Australia, but it might be some comfort for you to know that the Australian Post Office at least is hoping that it can swing this deal and help you to get back on an equal footing with Region II."

No doubt Mr. Wilkinson's comments are guarded in the extreme. Personally, I attach great significance to them and I hope that we may look forward to a time in the not too distant future when the Australian Amateur Service is able to use the 40 metre band up to 7.3 MHz.

Mr. Wilkinson concluded by congratulating the office-bearers of the Wireless Institute of Australia. He said that it was a great help to the Post Office to be able to deal with a united body—a group of people who they know represent the interests of the whole Amateur fraternity. He said that it would be a hopeless situation if they had to try and deal with individuals or with groups who were not as united as the Wireless Institute is. He said: "It's a credit to the members and to the office-bearers that we are able to get well reasoned and well represented cases and discuss them frankly and openly and come to what we believe to be a reasonable decision."

I know that Mr. Wilkinson regarded what he said in his speech as being of special significance. It is because I share that view that I have taken the unusual course of quoting from his speech at some length.

—MICHAEL OWEN, VK3JKI,
Federal President.

VK3 V.H.F. GROUP V.H.F. PRE-AMPLIFIER, MARK II.

This article has been essentially published to inform interested Amateurs of the changes in design and construction of the very successful v.h.f. pre-amplifier that originally appeared in "Amateur Radio" of July 1969. A great many enthusiasts have constructed this simple unit for operation within the Amateur bands, and more than a handful have been used in mobile radios by establishments outside the Amateur sphere of interest.

In response to suggestions by some interested Amateurs, we have undertaken to modify the old circuit and to include these in the new design. The suggestions were mainly concerned with protection of the semiconductor, however, as this required a change in the printed circuit design, we decided to examine the possibilities of further changes. By substituting a TIS88/2N545 in place of the device originally used, we have now brought this unit into line with our two metre and 70 centimetre converters.

This device (TIS88) has been found to be totally reliable and exhibits more than enough desirable characteristics. Further, this would reduce the need to carry a wide range of semiconductor devices that essentially do the same operation.

Throughout these modifications, we have kept in the foreground of our consideration the basic requirements for the effort necessary in making changes mentioned above.

The design objectives of the pre-amplifier were:

- Best noise figure possible consistent with reasonable cost.
- Sufficient gain so that the system noise figure is determined by the pre-amplifier.

PERFORMANCE

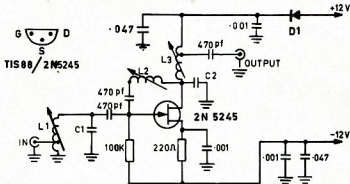
Once again noise figures of better than 2dB. have been obtained on both 2 and 6 metres. The gain on 2 metres is usually in excess of 18 dB, with gains of 22 dB. quite common. The gain on 6 metres, although not accurately measured, would as a function of the device parameters be slightly more.

DESCRIPTION

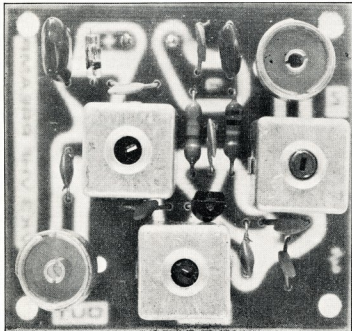
The pre-amplifier uses an TIS88/2N5245 JFET (Texas) in neutralised

common source configuration. Neutralisation is accomplished by adjustment of L2, which resonates with the drain to gate feedback capacitance to form a high impedance parallel tuned circuit at the operating frequency.

A supply of 6-15 volts is required. The design voltage is 12 volts, at which it draws approximately 4 mA. Positive and negative supply rails are d.c. isolated from earth, allowing operation with either polarity earth. The input and output impedances are 50 ohms, although the mismatch of a 70-ohm termination is negligible. The pre-amplifier may be left on during transmission periods. This will prevent changes in junction temperature detuning the pre-amplifier at switch-on.



VK3 V.H.F. GROUP PREAMPLIFIER



The pre-amplifier is constructed on a small (2" x 2½") glass epoxy board. All capacitances below 1,000 pF. are NPO disc ceramics. Above 1,000 pF., Hi-K disc ceramics are used. Resistors up to ¼ watt rating are suitable.

The coil formers used are Neosid Type A (single assembly) with F29 (v.h.f.) slugs. The bases usually provided have not been used, so as to maintain high unloaded tuned circuit Q. Instead, the boards are drilled 7/32" and the formers glued in. Coil details are given elsewhere.

APPLICATIONS

Use of the pre-amplifier will result in an improvement in noise figure over even the best valve type front ends, and most transistor and FET converters. In addition, the pre-amplifier may be employed to increase overall gain to a satisfactory level.

A great improvement will result when the pre-amplifier is used ahead of the front-end of a "carphone". Most "carphones" use a 6AK5 r.f. amplifier. The best noise figure that can be expected of this tube on 2 metres is 8 dB, but a more likely figure is 11 dB.¹ The improvement at 6 metres is less pronounced, but nevertheless worthwhile.

A word of warning is necessary in connection with "carphones". Some

Similarly, the change-over relays used in a few higher power "car-phones"—mainly to 25w, 3/20 type—have inadequate isolation between contacts. Damage may be prevented by connection of back-to-back diodes from input socket to earth, on the copper side of the printed circuit board. Almost any small signal diode, such as the OA95, will be adequate. This addition results in only a slight decrease in performance.

The Neosid coil formers should be mounted first. File off the locating lands and glue the formers in place, making sure that the slugs will line up with the position of the cans. When the glue has hardened, the coils may be wound and the cans soldered in place, after which the remaining components may be mounted.

Ensure that all earth connections to the board are removed prior to soldering in the FET. Although no special handling precautions are necessary, for best performances the FET should be pressed down to within 1/8" of the board. For soldering, a Scope soldering iron with clean pointed instrument tip is suitable.

L1—input coil, 22 S.W.G. tinned copper wire, $5\frac{1}{2}$ turns tapped $\frac{3}{4}$ turn from cold end (cold end being that end closest to the board).

L2—neutralising coil, 30 or 32 B. & S. enamelled copper wire, 19 turns close wound on board end of the former.

L3—output coil, 26 B. & S. enamelled copper wire, $11\frac{1}{2}$ turns tapped 3 turns from cold end of coil.

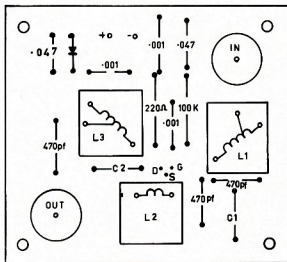
With the pre-amplifier mounted in its final position, connect the supply voltage. Peak L1 and L3 for maximum gain (or in a "carphone" maximum limiter current on a weak signal), adjusting the neutralising coil (L2) where necessary to restore stability.

A number of kits will be made available by the Disposals Committee of the W.I.A. Vic. Div. Only one type of kit will be assembled, each kit containing two superfluous capacitors for the band not required. Kits will include all components—board, resistors, capacitors, FET, wire, sockets, etc. The cost will be \$6.00 including postage.

East Melbourne, Vic., 3002.

We wish to acknowledge the original contribution to this project by the Projects Committee of the VK3 V.H.F. Group.

- (1) Orr and Johnston: "V.H.F. Handbook".
- (2) "The Real Meaning of Noise Figure," Kennedy, "Ham Radio," March 1969.
- (3) "VK3 V.H.F. Group Two Metre Converter," "Amateur Radio," February 1969.
- (4) Goodman: "Improved F.M. Operation," "Amateur Radio," April 1969.



LAYOUT OF V.K.3 V.H.F. GROUP PREAMPLIFIER.

A range of high quality controls designed to suit consumer, amateur and professional electronics applications having standard Australian dimensions is now available. Branded Noble, these potentiometers are individually packed in a dust-free, sealed pack. Technical data sheets on stock types is available from the Australian agents: Sonar Electronics Pty. Ltd., 30-32 Lexton Rd., Box Hill, Vic., 3128.

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa

Day	R	Day	R
1	77	16	106
2	64	17	98
3	68	18	108
4	59	19	117
5	65	20	107
6	68	21	117
7	72	22	108
8	82	23	101
9	76	24	116
10	71	25	106
11	75	26	114
12	73	27	91
13	92	28	101
14	94	29	114
15	108	30	120
		31	111

Mean equals 92.9.
Smoothed Mean for Feb. 1970: 106.7

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	98	16	81
2	104	17	83
3	110	18	73
4	111	19	98
5	114	20	114
6	133	21	123
7	136	22	106
8	135	23	104
9	116	24	120
10	163	25	114
11	73	26	107
12	76	27	82
13	73	28	85
14	76	29	81
15	75	30	77

Mean equals 98.8.
Smoothed Mean for March, 1970: 106.8

October 94	January 88
November 92	February 86
December 90	March 84

—Swiss Federal Observatory, Zurich

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Please address all articles to:
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P.O. BOX 36,
EAST MELBOURNE,
VICTORIA. 3002

A SOLID STATE AMATEUR S.S.B. RECEIVER

PART FOUR

B. G. CLIFT and A. E. TOBIN*

This article describes the design concepts, circuit operation and construction of the second mixer and its associated crystal oscillators.

In Part One of this series, mention was made of the bands to be covered, and we must point out that an error appeared in the specification for the frequency coverage of the 10 metre band. This should read 28.0-28.5 MHz. and 28.5-29.0 MHz. Obviously a continuous coverage of 1 MHz. is more useful if it is desired to cover the v.h.f. bands with a suitable converter.

Injection frequencies for the second mixer have been chosen carefully in order to minimise the effect of spurious responses generated by the beating of higher order harmonics producing difference frequencies which may lie within the receiver pass band. In addition, it was felt that the number of crystals required should be kept to a minimum in accordance with the overall design concept.

Table 1 shows the selected crystal oscillator frequencies used for the various bands and the output frequencies from the second mixer feeding the first mixer (refer to Fig. 1 in Part One).

The v.f.o. tuning capacitor is coupled to the dial assembly so that clockwise rotation of the tuning knob (and consequently left to right movement of the dial pointer) produces backward tuning of the v.f.o. This arrangement produces forward tuning on bands 1, 2, 5 and 6.

CIRCUIT DESCRIPTION

The crystal oscillator and mixer 2 have been assembled on the one plug-in printed circuit board. All switching of crystals and tuned circuits associated with both sections is achieved using diodes.

The circuit configuration of the crystal oscillator is of the Colpitts type similar to that used in the v.f.o. The tank circuit is fixed tuned to 25 MHz. with a 33 pF. ceramic capacitor, the resonant frequency being reduced to 24.5 MHz. or 21.5 MHz. by switching additional shunt capacitance across the coil.

The coil is wound on a Neosid type "A" former and consists of a primary of 14 turns of 26 B. & S. enamelled wire with a 3-turn link wound over the low impedance end of the primary. The coil is fitted with a tuning slug and mounted in the normal Neosid can, but no cup or ring is used. Output from the oscillator is coupled directly into the second mixer via the 3-turn link.

The diode switching of crystals and the tank circuit is performed using standard 1 x 12 switch wafers which are assembled on a clicker plate with the ball bearings and stop removed. The switch assembly is mounted at the rear of the turret tuner and connected to the tuner shaft via a small flexible coupling. Two wafer sections are required for switching the crystals and tuned circuits of both the crystal oscillator and the second mixer. An additional wafer is required for switching the v.f.o. output between the first and second mixers.

Although only three wafers are required for the receiver, it is worth considering the addition of a further three or four wafers and the use of a clicker plate with a longer shaft if it is contemplated adding an s.s.b. exciter at a later date. This would obviate the necessity of dismantling the front end for future modifications.

It should be pointed out at this stage that the turret tuner used is an early

Band No.	Coverage	Xtal Osc.	Mixer 2 Output	Mixer 1 Output	Tuning Mode
1*	3.5 - 4.0 MHz.	—	—	9.0 MHz.	Forward
2	7.0 - 7.5 "	21.5 MHz.	16.0 - 16.5 MHz.	9.0 "	Forward
3*	14.0 - 14.5 "	—	—	9.0 "	Backward
4	21.0 - 21.5 "	25.0 MHz.	30.0 - 30.5 MHz.	9.0 "	Backward
5	28.0 - 28.5 "	24.5 "	19.0 - 19.5 "	9.0 "	Forward
6	28.5 - 29.0 "	25.0 "	19.5 - 20.0 "	9.0 "	Forward

Table 1.

* For Bands 1 and 3, Mixer 2 is not used, the V.F.O. being coupled directly into Mixer 1.

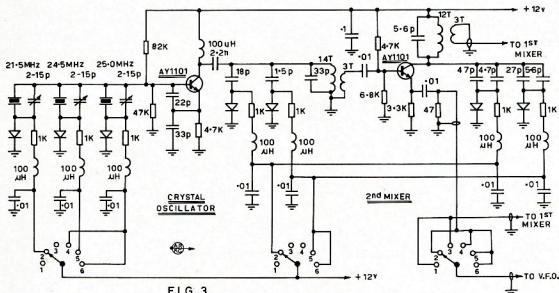


FIG. 3.

model Philips twelve channel tuner which has about $\frac{1}{2}$ " of the main shaft protruding from the rear. Only six of the available twelve switch positions are used on account of the physical size of the coils used for the lower frequency bands.

It is, however, feasible to provide additional bands at the high frequency end if adjacent switch positions are used above 14 MHz. For example, a further 1 MHz. of the 10 metre band could be covered which would then provide a full 2 MHz. for this band. This would add to the complexity of the tuned circuit switching arrangements for the crystal oscillator and second mixer and 25.5 MHz. and 26.0 MHz. crystals would also be required. Nevertheless, this modification is quite feasible and could be added if desired.

The second mixer uses an AY1101 with a tuned collector circuit, the output being link coupled to the first mixer. The coil is wound on a Neosid type "A" former and consists of 12 turns of 26 B. & S. enamelled wire with a 3-turn link wound over the low impedance end. This coil is also fitted with a tuning slug and mounted in the normal can, but no cup or ring is used.

The tank circuit is tuned to 30.25 MHz. with a fixed 5.6 pF. ceramic capacitor. An additional 32.6 pF. is switched across the coil to retune the output to 19.5 MHz. for bands 5 and 6, and 31.7 pF. is used to retune the output to 16.25 MHz. for band 2. The final values used for these shunt capacitors may need slight adjustment, depending on individual layouts. No adjustment should, however, be made until the layout is complete and all switching diodes are installed. The diode selected for all switching functions is the AN2002. This was chosen for its very low capacitance which is typically less than 2 pF.

CONSTRUCTION

No special techniques have been used in the construction of this section. The printed circuit board used is a universal

type board which has supply rails feeding all three sections, the top section being plain copper which may be scribed with an engraving tool for r.f. circuitry if desired. However, it was found subsequently that the "dotted" sections are quite suitable for the r.f. circuitry and are easier to use. Supplies of this board may be obtained from Colt Electronics, 61 Wise Ave., Seaford, Vic.

Fig. 2 shows a photograph of the completed board. On the top section is the crystal oscillator and on the lower section is the second mixer. Not shown are the two r.f. chokes associated with the output tuned circuit of the oscillator. These are mounted on the copper side of the board. The crystals used were Hy-Q miniature type K and these were soldered directly into the circuit. Output from the v.f.o. (via the switch) is coupled to the second mixer using a length of 50 ohm co-ax, which was soldered directly to the circuit.

Similarly, the second mixer output to the first mixer is also via a length of 50 ohm co-ax. soldered directly to the board. To facilitate removal of individual boards, miniature printed circuit type 50 ohm co-ax. sockets may be used instead. Lengths of 50 ohm co-ax. should then be made up with corresponding plugs at each end to interconnect the various r.f. modules.

R.f. chokes used are Aegis single-section miniature 100 μ H., but the value of inductance is not critical.

The next article will deal with the r.f. amplifier and first mixer, which are constructed on the turret.

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
757	11YRK	801	WA4VJW	845	AX3WQ
758	WGYM	802	PZSRK	846	WIDA
759	WIBPY	803	ZLBIHQ	847	1IFLN
760	WSCI	804	11WRP	848	AX3JNO
761	JA1HBC	805	ZM1BFR	849	WA6VOX
762	SP6BZ	806	AX6JK	850	G3GCG
763	DK3SD	807	WALJIC	851	W6QGF
764	AX3FJ	808	AX4KO	852	AX3IQ
765	DK2HY	809	G2BYI	853	W4DWT
766	W1BTU	810	K2SQM	854	V4VWT
767	WACEN	811	VEI	855	W1MBZ
768	AX2AYF	812	ZM3JU	856	G6UF
769	K1YZW	813	W3RU	857	W80B
770	AX4CY	814	VE3GHL	858	AX3MY
771	K7VZH	815	W2EV	859	VE3EO
772	11VK	816	AX6RK	860	AX3SX
773	JR1BMU	817	AX2BAG	861	EA8RK
774	WA4TD	818	W2CA	862	JABRA
775	ZL2ASM	819	AX4UA	863	D1JCG
776	UA5DG	820	G3VW	864	W1FLX
777	UB5FQ	821	TV8DDF	865	W3WNV
778	UK6AAB	822	SP2AJQ	866	GC3DE
779	UW0LK	823	W4SEZT	867	CHGB
780	AX2AMU	824	JALAT	868	VE7BO
781	W4SCT	825	AX7UX	869	AX3A
782	W8HID	826	AX2BMP	870	AX3BDQ
783	KL7HDB	827	W4YZI	871	AX3M
784	VESA	828	K7MCG	872	J4JOTE
785	AX3BET	829	ZL2BCJ	873	AX2BAH
786	AX2BAS	830	G3RUV	874	VE2WY
787	W4CZS	831	KP4DFX	875	W4YVQ
788	W4YOK	832	OKITA	876	VE2EQ/M
789	AX2AGF	833	K0RTH	877	ZL4BG
790	VE3EGT	834	W1AX	878	SM6CWK
791	DL2V	835	JH1HWN	879	K4MG
792	11VY	836	K7DJO	880	W4SKPL
793	AX3ATP	837	VE3GL	881	HRI
794	ZC4MT	838	F3BA	882	11DYN
795	AX3ALM	839	G3WLX	883	Z55WH
796	W2AJ	840	Y3EM	884	W5MAE
797	VE2AN	841	DL1QT	885	ZL1BKE
798	W0MAY	842	G4LGN	886	K2DT
799	OK2DB	843	G3BRW	887	V5SAF
800	W49SLD	844	G2DUP	888	W5YOR

V.H.F./U.H.F. SECTION

The following station has qualified for the Award:

Cert. No. 4—AX3AKR

V.I.F. V.H.F.C.C.

Cert. No.	Call	New Member:	Confirmations
76	VK7DK	169	—
77	VK7DK	—	153
Amendment:			
44	VK3AMK	157	—
73	VK3AMK	—	109

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R." in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

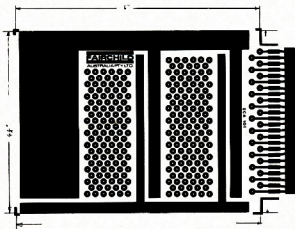


Fig. 1.

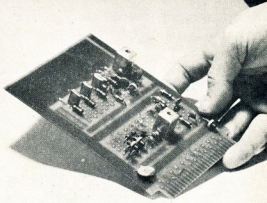


Fig. 2.—Showing printed circuit layout.

A Signal Source for Carphone Receiver Alignment

RON HIGGINBOTHAM,* VK3RN

The May 1969 issue of the Eastern and Mountain District Radio Club journal contained details of an extremely useful little "black box" for the alignment of f.m. carphone receivers. Since it operated from a 12v. 10 mA. d.c. supply, it held obvious attractions as a device that could be used away from power sources other than a car battery as well as in the shack for "ground based" receivers.

Another attraction was the fact that it could provide a low level signal when required (rather than having someone come up and provide carrier for your adjustments and thus occupy a net fre-

Initial bias on the diode is obtained from the two 47K resistors across the supply rail and initial frequency adjustment is made by means of the variable capacitor across the diode. Note that it may be necessary with some diodes to vary the top bias resistor until centre frequency is obtained with the trimming capacitor across the diode at half range.

On switching on the modulator the bias across the diode varies at an audio rate. This causes the capacity of the diode to change (also at an audio rate) and in turn the frequency of oscillation varies.

Two methods of construction have been used. One uses a printed circuit board and in the other system the components and transistors are mounted on tag strips which are attached to the lid of a small metal box.

In use this device has proven most useful. The only criticism is that the deviation is a little on the low side, but no doubt this could be improved by the use of a higher gain transistor in the audio oscillator, or an adjustment to the base bias. In use this slight lack of deviation has not proven any drawback.

It appears to go well with pretty well any modern crystal in the 2-15 MHz. range, but, as pointed out in the original article, older crystals such as the surplus DC11 series might need a higher gain device such as the 2N3565 in the crystal oscillator. Crystals much below 2 MHz. need different circuitry, which rather rules out the circuit as a 455 KHz. test oscillator.

Besides its utility as a signal source for the alignment of the r.f. and 1st i.f. stages of any 2 or 6 metre carphone of any make, it can also be used to line up the second i.f. stages if they are on a frequency of 2 MHz. or higher. All that is needed is a crystal of the appropriate frequency.

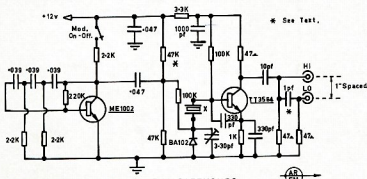


FIG.1. SIGNAL SOURCE FOR F.M. CARPHONES.

quency unnecessarily). Moreover, since the device could use the tx crystal from the set under adjustment, there was no need to buy new crystals for it.

Basically the circuit consisted of a crystal oscillator in the 2-15 MHz. range (which produced copious harmonics useful up to and beyond the 144 MHz. band) and a simple audio oscillator modulating the oscillator by means of a BA102 diode.

The circuit was originally developed by Ken VK3AKK and gave a "high" output for initial alignment and a "low" output for final tweaking to optimum performance.

A Chinese (more or less!) copy was hooked up according to the original article, but did not modulate too well. In retrospect this failure was probably due to the very old crystal used and was no reflection on the circuit as such. However, at the time, this point was not appreciated and Les VK3ZBJ came to the rescue with some minor circuit changes which got the device going. The circuit used is shown in Fig. 1.

The audio side uses a ME1002 transistor as a phase shift oscillator and with the values shown gives about a 500 Hz. note. The crystal oscillator uses a TT (or 2N) 3564 transistor and modulation is effected by the BA102 diode at the ground end of the crystal.

The high output is taken via a 10 pF. capacitor from the collector of the crystal oscillator. Originally it was suggested that a "low" output could be obtained from a second (unconnected) output socket located 1" away from the "high" output socket. In my case the coupling was not sufficient and was increased by the 1 pF. capacitor across the two sockets. This capacity can be varied to give a suitable "low" output. In my case this was 60 uA.

CHANGE OF ADDRESS

W.I.A. members are requested to promptly notify any change of address to their Divisional Secretary—not direct to "Amateur Radio".

DISTANCE TABLE FOR ROSS HULL V.H.F. CONTEST

	Syd.	Canb.	Bris.	Melb.	Hob.	Adel.	N.Z.	Dar.	Perth
Sydney	0	160	460	460	660	710	1300/ 1500	1950	2040
Canberra	160	0	600	290	530	670	1300/ 1500	1930	1940
Brisbane	460	600	0	860	1110	990	1500/ 1700	1790	2240
Melbourne	460	290	860	0	400	400	1500/ 1700	1930	1720
Hobart	660	530	1110	400	0	710	1300/ 1500	2280	1880
Adelaide	710	670	990	400	710	0	1900/ 2100	1620	1330
New Zealand	1300/ 1500	1300/ 1500	1500/ 1700	1500/ 1700	1300/ 1500	1900/ 2100	0	2550	3000/ 3200
Darwin	1950	1930	1790	1930	2280	1620	2550	0	1650
Perth	2040	1940	2240	1720	1880	1330	3000/ 3200	1650	0

* 43 Eleanor St., Ashburton, Vic., 3147.

HARMONICS

LECTURE No. 10A

C. A. CULLINAN,* VK3AXU

• Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

In our discussions on alternating current in Lectures 5, 6, 7 and 8 we have spoken of sine waves although at the end of Lecture 8 we did introduce the word harmonic.

Apart from this occasion we have assumed that the sine waves have been perfect, that is, if drawn, they would assume the shape of a perfectly drawn sine curve.

However it is very seldom, if ever, that man can produce a perfect sine wave. Admittedly there are sine wave generators which produce almost perfect sine waves. For instance our A.W.A. low distortion oscillator can produce waves which are within 99.9% of perfect and there are very expensive laboratory oscillators which can do even better.

A mechanical device which produces an almost perfect sine wave is a tuning fork.

Some sine wave generators may have as little as 0.001 of 1% distortion. Measurements made of the S.E.C. mains gave a distortion figure of 4%, whilst that of a diesel alternator plant was 10%.

HARMONICS OF MUSICAL INSTRUMENTS

Let us consider some common musical instruments such as a piano, harp and violin. Also let us assume that we have a tuning fork tuned to A440 cycles per second and that using this tuning fork as a reference we tune one of the strings of each instrument to A440. Then each of these strings is tuned to the same frequency, 440 c.p.s. However, if we strike the tuning fork, then play each instrument string we can differentiate between each instrument because each will have a distinctive sound of its own, so we can say "that's a piano" or "that's a harp" and so on.

This is because each string not only vibrates at its fundamental frequency but at a number of multiples which are known as "harmonics". It is mainly the distribution of these harmonics in relation to the fundamental frequency that gives each instrument its distinctive tone.

This may be more readily understood by comparing the energy distribution given by three musical instruments when playing Middle C = 256 c.p.s. (In concert pitch, Middle C = 273 c.p.s., French Pitch = 261 c.p.s., Scientific Pitch = 256 c.p.s.)

Energy in Percentage

	Flute	French Horn	Violin
Fundamental	13%	2%	60%
2nd Harmonic	40%	10%	8%
3rd Harmonic	10%	50%	20%
4th Harmonic	20%	15%	10%
5th Harmonic	5%	5%	2%
6th Harmonic	2%	2%	0
Remainder	10%	16%	0
Total	100%	100%	100%

From this table it can be seen, quite easily, that (for Middle C) the violin produces 60% of its total energy in its fundamental tone (also known as the 1st harmonic), and the next dominant tone is the third harmonic (256 and 768 c.p.s. respectively). However, the flute produces considerable energy at the second harmonic (512 c.p.s.) together with a considerable amount of energy at the 4th harmonic (1,024 c.p.s.), but the French horn generates half its energy at the 3rd harmonic (768 c.p.s.) whilst the fundamental is only 2%.

It is only right to point out that the instrument is an extension of the player and the sounds produced by a particular player are dependant, not only on his skill, but the quality of the instrument and its acoustic surroundings. The difference between, say, a good violinist and a poor one (using the same violin) lies completely in the subtle harmonic differences of the fundamental notes, which each player produces. Also whilst a good violinist may be able to get better sound from a poor violin he can never get the same sound as from a good instrument.

Whilst dealing with musical instruments it should be pointed out that sound is the subjective result of vibrations in the air, and that such vibrations have a special appeal to our senses when these vibrations are in the form of a sine wave or consists of a number of sine waves which have frequencies related to each other in ratios of small whole numbers such as 1:2, 1:3, 1:4, 3:4, etc.

However, a sound will be discordant if there is no such simple relationship between the frequencies, and if there are a large number of such discords the sound becomes noise.

Referring back to the table for a violin for instance, it will be noticed that this instrument produces harmonics up to the sixth and that these all bear simple ratios.

RADIO HARMONICS

Now all this brings up a major point in audio frequency amplification and radio transmission (telephony).

We have seen that the three musical instruments mentioned in the table each produces a different sound although each is playing the same fundamental frequency, and that this difference in sound is what makes each instrument

different. This is true of all musical instruments and is also true of the human voice.

If we are to amplify or to transmit by electrical means music or speech it is essential that we do not change any of the sound of the instruments or the voice which makes the sound, because if we do so, then what we ultimately hear will not be a true reproduction of the original.

To do this it is necessary for us to pass the material through a linear system because if the system is not linear then it will generate additional harmonics which will "colour" the original material if they are strong enough in relation to the particular material, and the resulting sound may become unpleasant to the listener.

So far the discussion has been with frequencies in the audible range, but these remarks also apply to radio transmission where there may be two types of problems.

A radio transmitter generates what is known as a radio frequency wave and if the transmitter is being used for telephony then it is necessary to apply audio frequencies to the radio frequencies by one or more processes known as modulation.

The first problem is that the transmitter may generate harmonics at radio frequencies.

Usually in the interest of efficiency the transmitter will be operated in such a manner that it will generate harmonics and if these are radiated they can cause serious interference to other services.

There are some designs of transmitters where harmonics are deliberately generated, at a lower frequency than that feeding the aerial. This is usually done because it is easier to get good frequency stability at a low frequency than it is at a high one.

Well designed transmitters use considerable shielding, as well as specially tuned circuits or filters, to remove harmonics as far as practicable before they reach the aerial. It must be remembered that an aerial may be designed to resonate at one particular frequency of operation, but it too will radiate harmonics at harmonic frequencies if it is supplied with them, because of insufficient harmonic suppression within the transmitter and aerial coupling circuits.

By its very nature, the oscillator in a transmitter will generate some harmonics, and the following stages of amplification will amplify these if the intermediate tuned circuits cannot remove them, thus they may get through to the final radio frequency stage for further amplification. Therefore a skilful designer will reduce these harmonics to a minimum, nevertheless the final radio frequency amplifier may generate its own crop of harmonics.

The Australian Broadcasting Control Board in its Standards for Technical Operation of Medium Frequency Broad-

* 6 Adrian Street, Colac, Vic., 3250.

casting Stations, 2nd Edition, 18th June, 1968, specifies the maximum field strength of any single frequency spurious emission (no matter what the cause).

Generally the maximum harmonic field strength permitted is 1 mV/m. at one mile from the aerial (A.B.C.B. Standards 50). Alternatively, under the I.T.U. regulations (Geneva 1959) from 1st January, 1970, the mean power of any spurious emission supplied to the transmission line must be 40 dB. below the mean power of the fundamental without exceeding the power of 50 milliwatts. Note that this applies to the input to the transmission line, not to the aerial. In some circumstances the A.B.C.B. may require far lower spurious radiation.

We have stated already that harmonics radiated from aerial systems can cause harmful interference to other services. Let us take an example. Assume that two transmitting stations are close to each other, and that the general location is close to a busy capital city port. Let these hypothetical stations operate on 912.5 KHz. and 1315 KHz.

These frequencies have been chosen to avoid embarrassment to any Australian stations as none operate on them. Also, let us assume that the first station has a measured field strength at one mile of 1 mV/m. at the second harmonic. Some calculations produce a disturbing result, so let us do these calculations.

Station A:

Fundamental frequency, 912.5 KHz.
Second harmonic (912.5×2), 1825.0 KHz.

Station B:

Fundamental frequency, 1325 KHz.

Now there will be two new frequencies produced by the second harmonic of A and the fundamental of B, and these can be detected by receivers tuned to each of them over a distance of possibly 15 to 20 miles. These new frequencies have been produced through the phenomenon known as Beats.

These new frequencies will be the sum and difference frequency between the second harmonic of A and the fundamental of B, and will be 3150 KHz. and 500 KHz. respectively.

This latter is the International Distress Frequency and in the circumstances outlined, considerable interference could occur to distress calls. In this case the Administration would require station A to reduce its second harmonic to a level where there would not be interference on 500 KHz.

From all this, it can be seen that radio frequency harmonics generated in a transmitter, then radiated either directly from the transmitter itself, from the transmission line, or the aerial, can cause serious interference to other services, so they are unwelcome signals.

Secondly, during the process of applying audio frequencies to a transmitter, known as modulation, it is quite possible that additional audio frequency harmonics will be generated and these will show up as distortion of the original audio frequency wave forms. If the amplitude of these is great enough the resulting transmission will be harsh

and not a faithful reproduction of the original signals.

There are two fundamental types of modulation, known as Amplitude Modulation and Angle Modulation.

Amplitude modulation is a process in which the amplitude of a transmitter's carrier wave is varied by the impressed audio frequency wave. There are several methods of achieving this.

Angle modulation is a process in which the phase angle of the carrier is varied by the impressed audio frequency wave.

Phase Modulation and Frequency Modulation are particular forms of Angle Modulation.

WHY ARE HARMONICS GENERATED?

Now let us ask ourselves a question, then answer it.

In an electronic audio or radio frequency system why are harmonics generated? Answer: Because the system is not linear.

Let us take a look at the reason for this. If we set up a vacuum tube rectifier valve and apply increasing voltage between the anode and cathode we can measure the current flow through the valve with an ammeter connected in series in the circuit, and on squared graph paper we can plot a curve showing the relationship between impressed voltage and current flow.

It will be found that at low voltages the curve is not a straight line, then as the voltage is increased the line will become virtually straight, however at some high voltage the line will again depart from its straight form to become curved. This is where the cathode runs out of emission. (The valve may flash-over before this point is reached.) This is the elongated S of Fig. 1a. The general shape of the curve is the same for all high vacuum rectifiers although the slope may differ between different valve types. All of these remarks apply to a half-wave rectifier, and after all a full wave vacuum tube rectifier consists of two half-wave rectifiers in the same envelope.

An examination of this curve reveals that there is a linear relationship between applied voltage and the current passed over most of the curve, but at both ends there is a marked departure from the linear condition.

This curve is, also, a generalised curve for a valve amplifier valve hav-

ing sufficient bias to cut-off the plate current, and which runs out of cathode emission at the other end of its curve.

As an example, we may take the case of a class C stage of a plate modulated telephony transmitter. The class C amplifier operates with a very high grid bias, several times that needed for plate current cut-off. The a.c. modulating voltage adds or subtracts to the d.c. plate voltage so that at 100% positive modulation the peak plate voltage is double the d.c. plate voltage, whereas on the negative swing of the modulating voltage this subtracts from the d.c. plate voltage with the result that at this point it exactly cancels the d.c. plate voltage.

If the class C amplifier stage has been properly set-up, and an analysis is made of the resultant modulated wave at 100% modulation with, say, an audio frequency of 1,000 Hz., then it will be observed that the wave is symmetrical, that is both positive and negative sides (peaks) are the same. This measurement can be done best when a sine wave is used for modulation, with a cathode-ray oscilloscope, or with an amplitude modulation monitor.

However, after some considerable time, it may be found that the positive and negative peaks are no longer the same, that is the wave is not symmetrical, also that there is serious harmonic distortion.

Although the d.c. plate current is still the same, assuming that there has not been any change in the adjustment of the transmitter, then it will be found that whilst the negative half of the modulating voltage can take the class C amplifier to 100% negative modulation, the positive modulating voltage cannot raise the amplifier to 100% positive modulation.

What has happened is that the class C amplifier valve has started to lose cathode emission and the loss can only be detected when the plate voltage is swung high in a positive direction by the modulating voltage. The class C stage valve is then operating in the top curved position of the curve in Fig. 1a.

It is only proper to state that this is the loss of peak cathode emission. If the valve or valves causing the asymmetrical modulation are left in use the emission will drop to the stage where it becomes apparent due to lower than normal d.c. plate current.

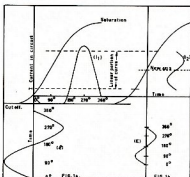
It may not be clear from the diagram in Fig. 1a that the elongated S current is derived by applying various d.c. voltages to the valve.

If an a.c. voltage is applied then no part of the curve can be completely straight simply because there are no two successive points in a sine wave which make a straight line. Theoretically this can be taken to two consecutive electrons and is due to the fact that the angle of the current is continuously changing, whether we consider this change in single degrees, or say one millionth of a degree.

The sine curve of Fig. 1a when projected via the elongated S current curve produces the current curve II of Fig. 1a.

The student should draw these curves to satisfy himself.

In Fig. 1a we have shown, too, a sine wave whose axis passes through



the current curve slightly to the right of the cut-off point. By extending the sine wave curve upwards, to where it intersects the current wave we can plot a graph or curve of the current which flows in the valve due to the excitation by the sine wave. As this wave proceeds from 0° to 45° in a negative direction the valve is driven to the cut-off point then past this position so no current can flow in the circuit.

It will be noticed that a small amount of current will flow between 0° and approximately 45° since the cut-off point corresponds to approximately 45° .

From 45° to 90° the valve is driven past cut-off so no current can flow.

After 90° the exciting voltage starts to drop to zero at 180° . However when it reaches 135° it has come back to the cut-off point, so that from 135° to 180° a small amount of current may flow. It must be remembered that although the exciting wave is now in a conducting portion of the valve curve, the exciting voltage is, itself, falling to zero until at 180° there is no exciting voltage, hence no current.

As the exciting voltage (e) increases in a positive direction from 180° to 270° , the valve will conduct so that current flows in the valve.

This is shown in curve (II) Fig. 1a.

But it will be seen that as the exciting wave approaches 270° the current (II) does not increase in proportion and (II) does not regain its shape until after the exciting voltage has passed 270° .

Curve (II) between the lines marked "linear portion of curve" appears to be a straight line on each side and can be considered linear, but the parts outside the linear portions are curved and it is operation in these regions that produce harmonics.

It will be noted, too, that the curve (II) is far from the same shape as the exciting voltage curve (e), in fact it is approximately only half of it.

This is the type of curve we get when a rectifier valve changes a.c. into d.c., when an amplifier, whether audio or radio frequency distorts or when a frequency multiplier is used in a transmitter to produce high frequency from a lower one by harmonic multiplication.

Now let us look at Fig. 1b. The elongated S curve is the same as that of Fig. 1a (as near as we could draw it and means exactly the same). But this curve is taken to represent an amplifier valve, not a rectifier.

An amount of negative bias has been applied to the grid of the valve so that its operating point is half way along the linear portion of the curve.

Now if an a.c. exciting voltage (E) is applied and its maximum negative and positive peaks do not pass beyond the limits of the linear portion of the curve, then the resultant curve (I2) will have an identical shape to the shape of the exciting voltage (E). Its amplitude may be greater or lesser depending on whether the valve has a gain greater than unity, but the shape will be similar, i.e. if (E) is a sine-wave, then (I2) will be a sine-wave.

Now, if the exciting voltage E is increased in amplitude its negative and

• The frequencies of all the stations mentioned in this lecture were as stated at the time the lecture was written. However, with the passage of time, some station frequencies may change, therefore any Amateur wishing to calibrate equipment by using b.c. stations as frequency references should verify the frequency of each station beforehand. A list of stations may be obtained from the Australian Broadcasting Control Board, 373 Elizabeth Street, Melbourne, Vic., 300.

positive peaks will exceed the linear portion of the current curve and (I2) will no longer be a sine-wave as its negative and positive peaks will be flattened as shown in the half cycle (I1) of Fig. 1a. Distortion will result as harmonics will be produced.

Also, if instead of altering the amplitude of the exciting voltage (E), the bias points (new axis) is moved, then again the resultant wave will not be symmetrical.

Notice should be taken in Fig. 1a and 1b that although the current curve is the same in both, amplitude of the exciting voltage (E) has been reduced to make it fit the linear portion of the current curve.

The student should draw these curves, also draw a larger sine-wave (E) and plot this when he will find that the peaks of the plotted current curve are flattened as has been stated.

To show how harmonics distort a pure sine-wave, Figs. 2 and 3 should be examined. In Fig. 2 the single cycle represents a sine-wave. Superimposed on this is a smaller amplitude wave of two cycles, this being the second harmonic of the sine-wave. Actually this is a co-sine-wave, that is one which reaches its maximum value 90 electrical degrees before a sine-wave would do so. However, it is important to realise that in Fig. 2 there are two cycles of the co-sine-wave and only one cycle of the sine-wave. A single

cycle co-sine-wave would be shown starting with maximum current of 0° .

In order to illustrate the effect of a second harmonic on its fundamental (1st harmonic) the maximum amplitude of the second harmonic has been made about 37% of the fundamental, this being the most that could be drawn in the space available.

A second harmonic of this magnitude will greatly modify the fundamental and normally such a harmonic would not be found in any form of electrical reproduction unless the equipment is badly out of order. This statement does not apply to transmitters where frequency multiplication is used. Also, it does not apply to musical instruments (as already shown) including those using electrically generated tones.

The manner in which the second harmonic modifies the fundamental may be found by adding, algebraically, the amplitudes of the fundamental and the second harmonic at any given time (electrical degree), remembering that those parts of the curves above the axis are positive and those below are negative.

It will be observed that at 90° the maximum positive portion of the first cycle of the second harmonic will subtract from the maximum of the fundamental so that the amplitude of the latter is greatly reduced. However, the maximum positive portion of the second cycle of the harmonic adds to the maximum positive portion of the fundamental, thus increasing it.

This means that the original sine-wave of Fig. 2 is no longer symmetrical, hence it is distorted.

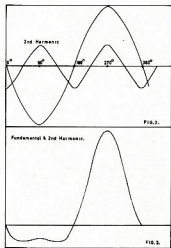
The curves of Fig. 2 have been added together and produce the curve shown in Fig. 3. Note that the negative portion of the sine-wave of Fig. 2 has been greatly reduced in amplitude and that it has been grossly flattened. On the other hand, the amplitude of the positive half has been increased considerably, although its base line is the same, and its shape has changed a little too. So this is what happens to a wave having a large second harmonic.

Actually its general shape in the positive direction closely resembles that of the current wave I1 of Fig. 1 (the drawing scales are not the same) and this proves what we set out to prove, namely, that a rectifier can produce considerable harmonic distortion, as can a valve rectifier which is either wrongly biased or has too great an exciting voltage on its grid.

For simplicity, Figs. 2 and 3 do not show other harmonics, but the student can add these. For instance, three cycles of 3rd harmonic can be drawn in Fig. 2. The first cycle can start in a positive direction at 0° with maximum at 30° , maximum negative will be at 90° and so on. Again for simplicity this could be made, say 10° of the fundamental. Then Fig. 3 can be replotted using the figures or dimensions obtained by adding together the fundamental, 2nd and 3rd harmonics when it will be seen that there are more changes in the overall shape of Fig. 3.

It is rather difficult to draw, graphically, and specially at low levels, any further harmonics.

(to be continued)



John Moyle Memorial National Field Day Contest, 1971

SATURDAY, 13th FEBRUARY, TO SUNDAY, 14th FEBRUARY, 1971

The Federal Contest Committee of the Wireless Institute of Australia invites all Australian Amateurs and Short Wave Listeners to participate in this Annual Contest, which is held to perpetuate the memory of John Moyle, whose efforts advanced the Amateur Radio Service.

There are two divisions of this Contest, one of 24 hours continuous duration, and one of 6 hours continuous duration. The six-hour period has been included to encourage the operator who is unable to participate for the full 24-hour period. The 24-hour continuous operation is to be chosen by operator from 26-hour period.

Operators using 25 watts or less input to the final stage will be considered for a certificate where his activity warrants its issue.

DATE

From 0600 GMT, 13th February, 1971, to 0800 GMT, 14th February, 1971.

OBJECTS

The operators of Portable and Mobile Stations within all VK Call Areas will endeavour to contact other Portable/Mobile and Fixed Stations in VK Call Areas and Foreign Call Areas.

RULES

1. There are two divisions, one of six (6) hours, and one of twenty-four (24) hours duration. The six-hour period for operating may be chosen from any time during the Contest, but the six-hour period so chosen must be continuous. In each division, there are six sections:—

- Portable/Mobile Transmitting, Phone.
- Portable/Mobile Transmitting, C.w.
- Portable/Mobile Transmitting, Open.
- Portable/Mobile Transmitting, Multiple Operation, open only.
- Fixed Transmitting Stations working Portable/Mobile Stations, open only.
- Reception of Portable/Mobile Stations.

2. All Australian Amateurs are encouraged to take part. Operators will be limited to their licensed power. For Portable entries, power shall be derived from a self-contained and fully portable source.

(a) Portable/Mobile Stations shall not be situated in any occupied dwelling or building. Portable/Mobile Stations may be moved from place to place during the Contest.

No apparatus shall be set up on the site earlier than 24 hours prior to the Contest.

All Amateur bands may be used, but no cross band operating is permitted. Cross mode operation is permitted.

Entrants in Section (d) for Multiple Operator Stations can set up separate transmitters to work on different bands

at the same time. All such units of a Multiple Operator Station must be located within an area that can be encompassed by a circle not greater than half a mile diameter.

For each transmitter of a Multiple Operator Station a separate log shall be kept with serial numbers starting from 001, and increasing by one for each successive contact. All logs of a Multiple Operator Station shall be submitted by the operator under whose Call Sign the transmitters are working. No two transmitters of a Multiple Operator Station are permitted to operate on the same band at any time.

3. Amateurs may enter for any section.

4. One contact per station for phone to phone, also one for c.w. to c.w. per band is permitted. Cross mode operation will be accepted for scoring.

5. Entrants must operate within the terms of their licences and in particular observe the regulations with regards to portable operation.

6. For VK stations contacting VK stations, the exchange of serial numbers consisting of RS or RST report plus three figures commencing with 001 and increasing by one for each successive contact by the VK station shall be proof of contact. The exchange of RS or RST reports only with non-VK stations shall be sufficient proof of contact for this contest.

7. Scoring—

(a) Portable/Mobile Stations:

For contacts with Portable/Mobile Stations outside entrant's Call Area 15 points

For contacts with Portable/Mobile Stations within entrant's Call Area 10 points

For contacts with Fixed Stations outside the entrant's Call Area 5 points

For contacts with Fixed Stations within the entrant's Call Area 2 points

(b) Fixed Stations:

For contacts with Portable/Mobile Stations outside entrant's Call Area 15 points

For contacts with Portable/Mobile Stations within entrant's Call Area 10 points

Operation via active repeaters or translators is not allowed for scoring purposes.

8. The following shall constitute Call Areas: VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8, VK9 and VK0.

9. All logs shall be set out under the following headings: Date/Time (G.M.T.), Band, Emission, Call Sign, RST/No. Sent, RST/No. Received, Points Claimed. Contacts must be listed in numerical order.

In addition, there shall be a front sheet showing the following information:—

Name.....Address.....

Call Sign.....Section.....

Division.....(6-hour or 24-hour)

Points Claimed.....

Call Sign of other op/s (if any).....

Location of Portable/Mobile Station.....

From.....hours to.....hours

A brief description of equipment used, and points claimed, followed by the declaration:

"I hereby certify that I have operated in accordance with the rules and spirit of the Contest."

Signed.....Date.....

10. The right is reserved to disqualify any entrant who, during the Contest, has not observed the Regulations and the Rules of this Contest, or who has consistently departed from the accepted code of operating ethics.

11. The decision of the Federal Contest Manager of the Wireless Institute of Australia is final and no disputes will be entered into.

12. Certificates will be awarded to the highest scorer of each section of each division. Additional certificates may be issued at the discretion of the F.C.C. The six-hour certificates cannot be won by a 24-hour entrant.

13. Return of Logs:

All entries must be postmarked not later than 7th March, 1971, and be clearly marked "John Moyle Memorial National Field Day Contest, 1971" and addressed to:

Federal Contest Manager, W.I.A.,
Box N1002, G.P.O.,
Perth, W.A., 6001.

RECEIVING SECTION

14. This section is open to all Short Wave Listeners in VK Call Areas. The Rules shall be the same as for the Transmitting Stations, but may omit the serial numbers received.

Logs must show the Call Sign of the Portable/Mobile Station heard, the serial number sent by it, and the Call Sign of the Station being worked.

Scoring will be on the same basis as for Transmitting Stations. It will not be sufficient to log a station calling CQ. A portable/mobile station may be logged once only for phone and once only for c.w. in each band.

Awards: Certificates will be awarded for the Highest Scorer in each Call Area, for the 6-hour and the 24-hour divisions.

* No claim Fixed Station.

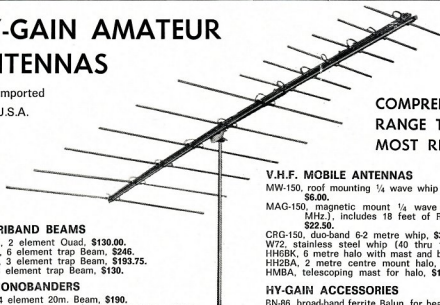
Example of Victorian S.w.'s Log

Date (GMT)	Band (mhz)	Call Sign Heard	RST No. Sent	Station Worked	Pts. Clm.
13/2/71					
0600	90	VK2AAH/P	59001	VK3ATL/P	15
0610	80	VK3ATL/P	59006	VK3OV	10
0620	40	VK2AAH/P	59004	VKEVF/P	15
640	20	VK3OV	59010	VK5OX/P	15
0900	20	VK4OF/P	59040	VK4OX/P	15

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203BA, 3 element 20m. Beam, **\$150**.
153BA, 3 element 15m. Beam, **\$94**.

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18AVQ, 10m. thru 80m. trap Vertical, **\$95**.
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MC Series coil and adjustable tip-rod assemblies:
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MC-40, 40m., **\$19.50** MC-10, 10m., **\$14.50**
MC-15, 15m., **\$16.60**

BPR, bumper mount, **\$12.50**.
BDYF, body mount, **\$9.00**.
SPG, heavy duty spring, **\$12.50**.
SPGM, light duty miniature spring, **\$6.00**.
OD, quick disconnect accessory for mobile whips, **\$6.00**.
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Also: Body mount co-ax. adaptors, gutter clips, whip fold-over adaptors.

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28, 8 element 2m. Beam, **\$29.50**.
215, 15 element 2m. Beam, **\$59**.
SGP-2, 2m. ground-plane, **\$12.50**.
GPG-2, 2m. $\frac{3}{8}$ wave ground-plane, **\$23**.
GP-50, 25 thru 54 MHz. ground-plane, **\$25**.

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MW-150, roof mounting $\frac{1}{4}$ wave whip (108 thru 470 MHz.), **\$6.00**.
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CRG-150, duo-band 6-2 metre whip, **\$38.00**.
W72, stainless steel whip (40 thru 100 MHz.), **\$15.75**.
HH6BK, 6 metre halo with mast and bumper mount, **\$34.50**.
HH2BA, 2 metre centre mount halo, **\$12.50**.
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EI, End Insulators, for doublets, **\$2 per pair**.
CI, Centre Insulator, for doublets, **\$7.50**.

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"Caslon" (Japanese), 12- and 24-hour, **\$24.50**.
EK-26, Katsumi Electronic Keyer, **\$75.00**.
K-109, Kyoritsu dual impedance 52 and 75 ohm SWR meter, **\$21.00**.
PS-750, PIC single-pole, 5-position co-axial line RF switch, **\$21.50**.
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PS-752, PIC single-pole, 2-position co-axial line RF switch, **\$15.50**.
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80-10 mx, peak in. 300w.

FTDX-400 TRANSCEIVER: 80/10 mx, PA two x 6KD6, 560w. peak input SSB, choice of manual, PTT or VOX operation. Full coverage on 10 mx, offset tuning, calibrator. Includes PTT mic. **\$595.**

FTDX-560 TRANSCEIVER: Now available here, this model (as sold in U.S.A.) is similar to the FTDX-400, with a different panel layout. PA two x 6KD6, 560w. peak input SSB. CW and SSB modes. Includes PTT mic. **\$595.**

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FT-101 TRANSCEIVER: Successor to the famous FTDX-100. 80/10 mx, SSB, AM, CW. PA two x 6JS6A, 300w. peak input SSB. Built-in dual AC/DC power supply. Low current drain, transistorised except for transmitter driver and PA. Plug-in modules, I.F. noise blanker, FET receiver RF, clarifier, built-in speaker. Ideal for portable/mobile from 12v. DC, or in the shack on AC. **\$675.**

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RACAL WINS FAIRCHILD PLANAR AWARD WITH NEW POWER AMPLIFIER

The 1970 Fairchild Planar Award, presented annually for practical application of semiconductor in a unique concept or design, has been won by Racal (Aust.) Pty. Ltd., who entered a power amplifier which is used in their range of high quality, high frequency s.s.b. transceivers.

The award, a bronze plaque featuring an engraved micro-circuit design, was presented to Mr. John Jackson, Chief Engineer of Racal, by Mr. John Baldwin, General Manager of Fairchild (Aust.) Pty. Ltd., at a function at the Wentworth Hotel, Sydney, on November 11, 1970.

"We believe that this amplifier was the first commercially available fully solid state 100 watt linear high frequency amplifier in the world," said Mr. Jackson, accepting the award.

Transceivers incorporating the new technology are now exported worldwide. They are also used extensively in Australia, particularly for post office out-back radio stations.

Presenting the award, Mr. Baldwin said, "The enterprise shown by Racal engineers in designing and developing this range of transceivers, and in winning the Planar Award, is just further evidence of the potential we have in Australia. When we tackle challenges in the right way, we take our place among the world's leading technological nations."

A & R-SOANAR GROUP APPOINTMENT

Mr. Barry T. Houston has joined the A & R-Soanar Electronics Group, Box Hill, Vic., as a transformer design and development engineer, where he will be engaged on forward research and development activities.

Formerly Mr. Houston was a design engineer with L. M. Ericsson Pty. Ltd., Trimax Division, and Thorn Electrical Industries Pty. Ltd.

INCREASE IN AMATEUR LICENCE FEES

Following the increase of Amateur licence fees from \$2 per annum to \$6 per annum announced in the last Budget, the following telegram was sent by the Institute to the Postmaster-General:

"The Wireless Institute of Australia refers to the Wireless Telegraphy Regulations Bill and asks that licence fee increase to \$6 be reviewed. Our request is justified on the following grounds—

1. The Amateur Service deserves special consideration because of community interests served in disasters.
2. The Amateur Service educates and encourages technical expertise.
3. Amateurs have no recourse to claim licence fees as a tax deduction.
4. The Wireless Institute is the only organisation representing a licensed communication service. By co-ordinating individual requests and with active self-policing committees, your Department's costs associated with managing the service and technical supervision are minimal.

We urge favourable reconsideration of the proposed licence fee increase."

"As addendum to previous lettergram, many Amateur licensees are pensioners and should be accorded similar concessions to those they presently enjoy as holders of broadcast and television viewers' licences."

—Peter D. Williams, VK3JZ,
Federal Secretary.

The following is the Postmaster-General's reply to the Institute:

Postmaster-General,
Canberra, A.C.T., 2600

Dear Mr. Williams,

I refer to your lettergram of 9th October, 1970, of the proposed increase in licence fees for amateur radio stations.

The existing licence fee for all types of radio-communication stations has remained unchanged since 1924, and in the 46 years between 1950 when stations were few in number and primarily provided a medium for emergency communication (ships, aircraft and defence) and revenue was small, but the difference was not great enough to cause concern. Since 1950, however, developments in techniques have been such as to permit a large scale expansion in the use of radio communication in the commercial and other fields. There are now more than 135,000 licensed stations of a variety of types operating under diversified rules designed to maintain the orderly development and conduct of services generally. At the same time the disparity between licence fee revenue and costs has continued to increase to a point where it was essential to introduce measures to remedy this situation. It must also be kept in mind that money values have changed so that the fee of \$2 which has applied since 1924 is the equivalent of \$7 today.

There have been developments in Amateur radio corresponding to those referred to above. In 1953, for instance, there were only 235 licensed amateur transmitting stations using quite limited operating techniques. The number has now grown to 6,538, comprising stations using a far greater range of techniques than in earlier years. Today, amateur licensees are authorised to pursue experiments in the U.S.F. and S.F.F. bands to undertake television experiments and to employ single sideband and pulse transmissions. Amateur licensees are also now asked to engage in experiments involving moon reflected signals and communication satellites.

In determining the new fee structure, which will apply to all radio services, account was taken of the fact that the costs associated with the licensing and surveillance of land and fixed stations are greater than those associated with stations in the mobile category, and, as you probably are aware, the fee for the former will be \$10 and for the latter \$6 per annum.

Although the large majority of amateur stations more appropriately belong to the fixed category, it was decided that they should be treated on an even basis with mobile stations to experimental and non-commercial activities warranted special consideration and that they should be included in the \$6 category.

Although it is appreciated that the amateur service is self regulated to a large degree, my

Department is required, in return for this \$6 fee, to grant licences, issue and record call signs, inspect stations, investigate complaints, arrange for reciprocal agreements with other countries, frequency measure and monitor transmissions as required, liaise with other Administrations and the International Telecommunication Union in regard to amateur radio matters generally.

I can assure you that, I am well aware of the part which amateur radio operators have played and are continuing to play in providing emergency communications during national emergencies. I also appreciate the encouragement given to the study of the radio art through amateur radio activities. At the same time I regret to advise that the Government cannot continue to subsidise the administration of amateur radio stations to the extent that it has done over recent years and that the way is not clear, therefore, to reduce the new fee of \$6.

The increased fees for licences will still not meet the discrepancy between revenue and costs and for this reason I am afraid it would not be possible to introduce concession fees for pensioner amateur station licensees, as requested. As you appreciate, the grant of such a concession would make it most difficult to reject claims by other amateur operators who may consider their situation warrants a similar concession.

Yours sincerely,

Alan S. Hulme,

Postmaster-General.

NEW CALL SIGNS

JULY 1970

- VK1BS—B. A. Stevens, 28 Adair St, Scullin, 2614.
VK2AIL—E. L. Law, 20 Bunara Rd., Gyea, 2207.
VK2AOW—R. J. Wirth, 22 Berry St, Cronulla, 2230.
VK2AQD—J. J. Clarke, 478 Lane Lane, Broken Hill, 2880.
VK2BIC—D. H. Watkins, 63 Beatrice St, Balgownie Heights, 2093.
VK2BMB—R. A. Balch, 24 Dress Circle Rd, Avalon, 2107.
VK2BRN—J. Wippo, 23 Judge St, Randwick, 2053.
VK2ZIL—K. J. Hargreaves, 186 Marks Pt. Rd., Marks Point, 2230.
VK2ZKM—G. L. May, 3 Walsh Ave., Maroubra, 2033.
VK2ZQH—P. J. Chappell, 4 Gallop Ave., Parkes, 2870.
VK2ZW—W. C. Coates, 66 Ferrier St, Lockport, 2556.
VK3GM/T—T. G. Foster, 802 Sebastopol St, Ballarat, 3350.
VK3JE—J. Bays, Station: 3 Allison Rd, Mount Eliza, 3930; Postal: P.O. Box 314, Clayton, 3169.
VK3JVU—L. Cunningham, 4 Eustace St, Wendouree, 3355.
VK3AE—R. Mc Vale, 955 Mt. Alexander Rd., Essendon, 3040.
VK3AQT—J. H. L. Field, 27 Reigate Rd., Brighton, 3216.
VK3BAO—R. J. Malcolm, Botsdale, 3666.
VK3BDQ—J. K. Horan, 34 Roberts St, Glen Waverley, 3153.
VK3BDU—H. H. E. Westerhof, Army Apprenticeship School, Brompton, 3057.
VK3FV—F. W. Fowler, 19 Orestes Rd., Yeronga, 4104.
VK4HQ—L. L. Crowe, 4 Orvieto Tce., Caloundra, 4551.
VK4KI—R. K. Rutherford, 7 White St, Nerang, 4211.

- VK4VA—V. F. Burman, 4 Mays Crt., Aitkenvale, 4214.
VK4XF—J. F. Russell, Station: Raintree Ave., Victoria Estate, 4840; Postal: C/o P.O., Victoria Estate, 4850.
VK4YA—G. T. Adamson, 3 Maker St., Toowoomba, 4350.
VK4YL—R. P. Bulman, 4/82 Apollo Rd., Bulimba, 4171.
VK4YV—V. M. Rhys-Williams, Station: Little Victoria Estate, 4183; Postal: C/o Post Office, Dunwich, 4163.
VK4ZAI—R. A. Isaac, 112 Auckland St., Gladstone, 4600.
VK4ZLR—A. R. Langmead, 38 Morrow Rd., Taringa, 4508.
VK4ZMJ—M. J. Joyce, 35 Prout St., Camp Hill, 4501.
VK5EN/T—A. R. E. Nitschke, 3 Hall St., Cummins, 5531.
VK5VP—E. J. V. Willis, 5/394 Glynburn Rd., Kensington Gardens, 5568.
VK5VT/T—N. S. Schahinger, 77 The Grove, Lower Mitcham, 5052.
VK5ZDM—P. R. Messer, 15 Brigalow Ave., Blackwood, 5051.
VK5ZPC—D. A. Gassner, 59 Russell Tce., Woodville Park, 5011.
VK5ZIG—G. W. Douglas, 123 Flinders Tce., Port Augusta, 5760.
VK5ZPA—P. A. Reichelt, 38 Gray St., Kilgarnie, 5009.
VK6BQ—R. R. Davies, Falls Rd., Lesmurdie, 6076.
VK6ML/T—Technical College Radio Club, Harold St., Mt. Lawley, 6650.
VK6VE—The Amateur Electronics Group, Blue Waters, Little Grove, Albany, 6339.
VK6CIE—F. W. Fletcher, Station: Portable; Postal: 53 Ives Park, Ringwood, England.
VK6ZAJ—G. Drange, 1/409 Cambridge St., Florent Park, 6914.
VK7GD—G. J. Vincent, C/o Hythen Hall, University of Tasmania, Sandy Bay, 7003.
VK8CW—C. F. Williams, 34 Memorial Dr., Alice Springs, 5750.
VK8ZF—G. S. Stephens, R/1377 Sergisons Crt., Rapid Creek, 5792.

CANCELLATIONS

- VK1BA—R. J. Mirids. Not renewed.
VK1DD—R. L. Davies. Not renewed.
VK1VJ—G. W. Douglas. Not renewed.
VK1ZAV—D. R. Avdall. Not renewed.
VK1ZJH—J. Hyne. Transferred to Vic. VK1ZJH. Not renewed.
VK1ZBA—R. A. Chapman. Deceased.
VK2OG—G. J. Menon. Deceased.
VK2QK—A. L. Manwaring. Deceased.
VK2ZS—W. J. Smith. Transferred to W.A. VK2ZS. Not renewed.
VK2AQ—L. J. Lee. Deceased.
VK2AQR—R. W. Rose. Deceased.
VK2ARW—H. H. E. Westerhof. Not renewed.
VK2ARQ—A. A. Rayner. Deceased.
VK2BAD—A. Davis. Transferred to A.C.T. VK2BAW. Not renewed.
VK2BBS—B. A. Stevens. Now VK1BS.
VK2BPO—B. E. Clouesley. Not renewed.
VK2ZBR—B. H. Ridley. Not renewed.
VK2ZBR—B. H. Ridley. Not renewed.
VK2ZDR—D. G. Hoskins. Not renewed.
VK2ZCG—J. J. Clarke. Now VK2AQD.
VK2ZNL—T. Treloar. Transferred to W.A. VK2ZNL. Not renewed.
VK2ZQA—R. J. Irving. Not renewed.
VK2ZQJ—P. R. Lorentzen. Not renewed.
VK3LW—L. McD. Stone. Transferred to N.S.W. VK3VJ. Not renewed.
VK3VJ—W. Harrison. Not renewed.
VK3AN—P. W. Collee. Not renewed.
VK3ASG—J. W. Brown. Not renewed.
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VK3AZH—K. J. Horstall. Not renewed.
VK3YAR—R. J. Malcolm. Now VK3BAO.
VK3ZL—R. G. Foster. Now VK3GM/T.
VK4LP—H. H. E. Westerhof. Transferred to W.A. VK4LP. Not renewed.
VK4RM—R. E. McDermott. Not renewed.
VK4VE—E. J. V. Willis. Now VK5VP.
VK4BK—R. B. Bulman. Not renewed.
VK4ZLO—L. A. Davies. Transferred to N.S.W. VK4ZTA. Not renewed.
VK4ZTA—G. T. Adamson. Now VK4YA.
VK5BV—A. A. Wheeler. Transferred to W.A. VK5BT. Not renewed.
VK5BT—J. Chamberlain. Not renewed.
VK5OJ—B. G. Daw. Deceased.
VK5SO—C. F. Williams. Now VK5CW.
VK5XW—C. F. Williams. Deceased.
VK5ZG—L. A. France. Not renewed.
VK6ZAL—A. L. Furnell. Not renewed.
VK6ZAS—T. N. S. Schahinger. Now VK5VT/T.
VK6ZIR—B. Watson. Not renewed.
VK6ZPH—C. L. Stephens. Now VK6ZF.
VK6ZZI—D. W. Friend. Transferred to N.S.W. VK6ZZI. Not renewed.
VK6ZG—R. E. Crowe. Not renewed.
VK6KG—F. Gosling. Transferred to N.S.W. VK6RI. Not renewed.
VK6RI—R. V. Bulman. Now VK4YL.
VK6ZBA—J. A. Cooper. Now VK3JC.



VHF NOTES

(continued from page 21)

George advises the Eastern Zone (Gippeland) v.h.f. boys have spent the winter constructing some very nice solid state gear for both v.h.f. and u.h.f. and generally upgrading their stations. Stations in the area will be on the lookout for contacts on 144.180 and below from 1900 onwards. Also during periods of intense 6 m opening look for Gippeland 2 m stations on 144.035 and 144.185 MHz. By next summer the Eastern Zone boys hope to have a 2 m beacon running. (That's really good news—SLP) 14 different stations will be active on 6 m from the Eastern Zone this season, and on 2 m you might care to look for any of these: VK3 JASV, 3YBY, 3ZNB, 3AXN, 3ZXQ, 3ZQC, 3ZAB, 3BBB, 3JDY and 3KR, while those experimenting on 432 MHz are 3ZQC, 3ZXM, 3ASV, 3YBI, 3KR, 3BB, 3YAX and 3ZNB.

Thank you George for filling in the gaps in the VK3 activity and this will now give those interested in short skip contacts plenty of opportunities.

Colin VK5DK (formerly VK5ZKR) of Mt. Gambier advises the South East Radio Group will be mounting a portable expedition to "The Bluff," 14 miles west of Mt. Gambier, over the New Year holiday week-end, operating on all bands from 80 metres through to 1296 MHz!

The station will be using the Club call sign VK5SR. Colin advises further information next month, and with the earlier publication of "A.R." for January, the information should get to readers ahead of the actual week-end involved.

Finally, the Festive Season draws near. I take this opportunity of wishing you all a very happy and prosperous Christmas and New Year period, with plenty of DX, and s.s.b. transceivers in your Christmas stockings. Many thanks to those who have helped these pages along during the year with notes and snippets of information. Please keep it coming, it's your page, let me hear from you.

Thought for the month: "A good many men still like to think of their wives as they do of their religion—neglected, but always there." That's all until next month. 73, Eric VK5LP. The Voice in the Hills.



CONTEST CALENDAR

*12th Dec., 1970 to 11th Jan., 1971: Ross A. Hull V.H.F. Memorial Contest.

13th/13th Feb.: John Moyle Memorial National Field Day Contest.

*N.B.—The dates initially published in the Contest Calendar have been altered to those shown above.

KITS

FM IF STRIP (ref. "A.R." June '70), \$9.50. Wired and tested, \$12.50.

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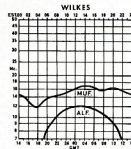
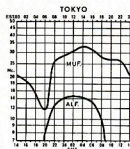
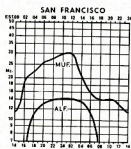
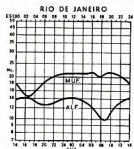
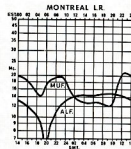
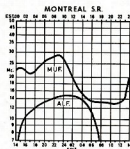
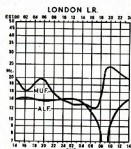
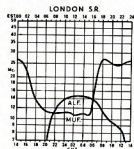
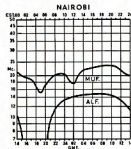
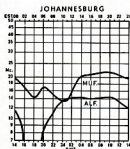
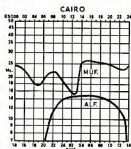
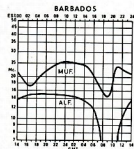
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PREDICTION CHARTS FOR DECEMBER 1970

(Prediction Charts by courtesy of Ionospheric Prediction Service)



Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

RE COOK AWARD 1970

Dear OM,
At the time of sending in my application for the "Cook Award" I left out a letter which I had written to accompany the list, but I omitted to enclose same.

While I am not yet in receipt of my Certificate, I do wish to state that this has been one of the most interesting awards that I have taken part in. I have been on the sick list for almost two years with a severe coronary and to quote the words of my Doctors, "I am giving you an objective to go for." It is on these grounds, that I wish to express my most sincere gratitude and also to your fellow Australian Hams I consider, that you have all shown how Ham Radio should be conducted, the courtesy shown in every QSO without exception has been a great pleasure. How I wish it all were to be able to make this known to all AX/VK Amateurs.

Again my most sincere thanks to you and all fellow Hams, I believe it to be true what my Doctors have said, you will therefore appreciate my deep sense of gratitude. I was not able to enclose any IRCs by virtue of my not having at present any income other than my State benefit.

—Frederick J. E. Bolton, G3VTQ.

"MORE HOWARD RYDERS CAN HELP"

Editor "A.R.", Dear Sir,
I was very interested to read the Editorial in the November issue because I travelled through India, and many other countries, a few months ago and had lived in Africa for many years. I had the pleasure of meeting VK3KI in Singapore for the first time. The editorial sums up a basic truth that hobbies, in general, are alien to the mentality of many tribes and peoples even if some individuals happen to be sufficiently wealthy to indulge in them. In Asia, however, the percentage of "have-nots" is vastly greater than here. In Africa, the percentage is even higher except in the south. Whilst education is a pre-requisite there still remains an almost complete lack of self-motivation.

In some ways India is a misleading example. Take such countries as I.A., IQI, XWS, SH3 and 9M6. How many of these countries are "local" (as opposed to expatriates) are licensed as Radio Amateurs? In India most of the calls are held by locals. This is a question of degree and in no way detracts from the force of the argument. The Editorial dealt with a country a little way up the ladder when compared with the level of Amateur Radio activities by locals in other less developed countries.

Amateur Radio needs more people like Howard Ryders everywhere. But without expatriates there would be a vacuum in many countries. A vacuum, not necessarily caused by a lack of interest or by lack of money, but caused by the official attitude towards the hobby. Such an attitude often is the expression of ignorance and fear. Many of us in Africa do much to demonstrate the art of Amateur Radio to the local officials and even Ministers in the hope that the future of licensing might be assured. Unfortunately, local officials do lose their offices, examples are VQ1, X22 and until recently YB.

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If the local Ministers are advised by knowledgeable and impartial expatriates the cause of Amateur Radio remains reasonably secure, notwithstanding the high standards set by qualifying technical examinations normally beyond the scope of the keenest local aspirant for a licence. The expatriate establishment also plays a perspective, the cries of doom from security wallahs. Sooner than later, however, expatriate posts are localised. When this occurs the continuous interchange of ideas and information between high ranking Amateurs at top levels achieves valuable results. If the remaining few expatriate Amateurs depart without replacement, the temptation to clamp down on licensing is great.

For India, seriously confronted with balance of payments problems and the associated controls over foreign exchange, there exists a need for the supply of components to the right people at a very modest price. Not free and convertible into gold bars or for lining the pockets of middle men, but aid in kind channelled through, perhaps, Amateur Radio organisations. An evening with the Madras Group convinced me of this. So many youngsters were present who drooled at the sight of a modern transceiver. Amateur Radio Handbooks seemed to be available but the components with which to experiment were very scarce indeed. Any of these Amateurs let loose at the "junk" sale as I saw recently at the Adelaide W.I. would have gone mad.

For the other countries lower down the rungs of the ladder there seems to be little real answer except time. A continuous succession of Howard Ryders can help. Getting at the local situation by direct means is often easier. Insuring that expatriates can always get licences, including reciprocal licences for visitors, can help provided the applicants are qualified of course. The removal of import prohibitions (as distinct from import restrictions) on transmitting apparatus is a basic pre-requisite. The Di. can make a contribution into some countries is the only mode open to the resident!

Visits overseas by your President are very valuable in this Region of relatively sparse Amateur populations when viewed against the background of persurasion by commercial and other interests for the allocation of spectrum space. I would suggest, however, that government authorities must accept much greater involvement with such a situation. The creed of isolationism never dies and seldom pays dividends.

—Peter B. Dodd,

Life Vice-Pre. Radio Soc. of East Africa, VK3CIF, VK3CIP, YA1PBD, GD3PBD, 7Q7PBD, VQ1PBD, etc.

DARWIN RADIO CLUB AT EAST POINT

Editor "A.R.", Dear Sir,
Please accept my many apologies for the error I made in the article I wrote on the Darwin Radio Club, printed on page 20 of the October 1970 issue.

I said that the Club premises were located at Lee Point. This is incorrect. The Club premises are located at East Point, repeat East Point. (D.C.A. have a receiving station at Lee Point—I had been writing various letters mentioning this place and typed the name in error when writing to the Darwin Radio Club.) East Point is the port war area and commands the entrance to Darwin Harbour. Lee Point on the other hand is the west of East Point. I am very sorry for this error and have written direct to the President of the D.R.C. (Basil Brodrick, VK3B) with my apologies for this error. The Darwin boys will probably rat and feather me if I ever return.

—W. A. Easterling, VK2ABL.

P.S.—Thanks for using the article.

SHORT WAVE PROPAGATION COURSE

Editor "A.R.", Dear Sir,
Some members may be interested to learn of a short wave propagation course available at no charge by writing to:

Information Service,
Radio Nederland,
P.O. Box 222,
Hilversum, Holland.

—Malcolm Sinclair, AX2BMS, ZM2BAA.

SILENT KEY

It is with deep regret that we record the passing of—

VK3SV—James Howarth.

RECIPROCAL LICENSING

The Reciprocal Licensing Agreement between Australia and the United States of America is generally well known. In effect, this provides that an Australian Amateur temporarily resident in the United States of America may be granted a Reciprocal Licence for the period of his stay in the United States of America.

The basis of the U.S. arrangement is that the Australian licensee is permitted to use his own call sign and is expected to comply with the terms of his Australian licence whilst using it in America. It is, however, important to make application for a Reciprocal Licence well before arrival in the United States. The processing of Reciprocal Licences can take between two to three months and there is just no way of shortening this period. Accordingly, Australian Amateurs intending to visit the United States are well advised to make application for a Reciprocal Licence at least three months before the time of their arrival. The Federal Executive is holding the appropriate forms of application and these will be given to members on application to the Federal Secretary.

HAMADS

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FOR SALE: One 8258 and socket, 33. Two new 6/40s and sockets, 54 each. One new 6/40 less socket, 33. One 6/40 less socket, 33. One 6/250s and sockets, \$10 each. One 4/250A less socket, 33. One Fil. Trans., 50. 30a. (for pair 4/250A), \$10. One Fil. Trans., 155. 30a. (for pair 4/250A), \$10. One Pwr. Trans., 425W, 150 mA., 3.6 V., 1.5 V., \$5. K. Seddon, 7 Wilson St., Brighton, Vic. Tel. 92-9960 (evenings, Melbourne).

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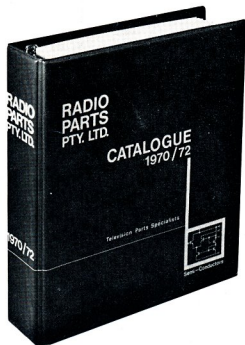
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